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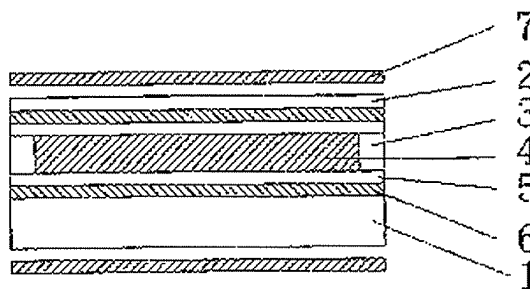
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(54) 【発明の名称】 液晶表示体

(57) 【要約】

【課題】 2枚のプラスチック基材間に液晶が封入されてなる液晶表示体において、2枚の基板の縦、横方向の物性の違いにより、液晶表示体そのものにソリや弛みが発生し、作業効率や見栄えが悪くなる欠点がある。

【解決手段】 2枚のプラスチック基材がシール材を介して貼り合わされ、この2枚のプラスチック基板とシール材により形成される空間内に液晶が封入された液晶表示体において、この1枚のプラスチック基板が厚く、他の1枚が薄く、かつ薄い方の基板の熱膨張率が厚い方の熱膨張率より大きくする。



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## 【特許請求の範囲】

【請求項1】 2枚の透明電極付プラスチック基材をシール材を介して貼り合わせ、該シール材と2枚の基板で囲まれる空間に液晶を封入した液晶パネルの両側に偏光板を貼った液晶表示体において、一方のプラスチック基材を厚くし、他方のプラスチック基材を薄くし、かつ薄いプラスチック基材の熱膨張率が厚いプラスチック基材の熱膨張率より大きいことを特徴とする液晶表示体。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は液晶表示体に関する。

【0002】

【従来の技術】携帯情報機器に使用される表示体として、その軽便性や割れない等の特徴からプラスチック基材を用いた液晶表示体が用いられている。

【0003】

【発明が解決しようとする課題】しかしながら、従来のこのような液晶表示体では、基材の剛性が劣たり、張り合わせた2枚の基板で、縦、横方向の膨張率が異なるため\*

プラスチック（膨張率、 $\times 10^{-3}/^{\circ}\text{C}$ ）      プラスチック（膨張率、 $\times 10^{-3}/^{\circ}\text{C}$ ）

ポリエチレンテレフタレート（10）> ポリエーテルスルホン（4.8）  
 ポリメチルメタクリレート（8）> ポリスルホン（5.5）  
 ポリアリレート（6.2）> ポリエーテルスルホン（4.8）

【0008】

【発明の実施の形態】本発明の液晶表示体の断面図を図1に示すが図において、1は透明電極付厚めのプラスチック基板を、2は透明電極付き薄めのプラスチック基板を、3はシール材を、4は液晶を、5は配向膜を、6は電極を、7は偏光板をそれぞれ示す。

【0009】厚い方のプラスチック基板の熱膨張率を小さくし、薄いプラスチックの熱膨張率を大きくし、図1のような液晶表示体を組み立てることにより、厚い方のプラスチック基板によりパネル全体の剛性をもたせる事が出来、また薄い方のプラスチック基板はパネル作成後室温に戻すと収縮し意に内側の力が働き、この力を厚い方の基板で外側にひっぱっているため常に張力が働き、薄いプラスチック基板がたるむようなことはない。

【0010】

## 【実施例】

（実施例1）市販の300ミクロンのポリエーテルスルホンにITO電極をつけ一方の基板とし、他方の基板として市販のガスバリアー膜付きフィルムAT3500（藤森工業製、約100ミクロンのポリアリレート系フィルム、電極付き）を選び液晶セルを組み立てた。セルの組立方法を述べると以下の通りである。短冊状の電極のついた2cm×5cmの基板を用意し、この基板を洗剤、純水で洗浄し、乾燥した後、この基板上に配向膜（RN799、日本合成ゴム製）を、回転数2000

\*め液晶パネルにそりが発生し、作業性が満足できるものではなかった。そして、これらの欠点を解決するために、プラスチック基材として厚い2枚の基板を用いることによりソリの発生を防いでいた。しかしこの方法では軽さと、薄さを犠牲にするため満足できるものでなかった。

【0004】そこで本発明は、ソリの発生が無い液晶表示体を提供することにある。

【0005】

10 【課題を解決するための手段】請求項1記載の発明は、2枚の透明電極付プラスチック基板をシール材を介して貼り合わせ、このシール材と2枚の基板の作る空間に液晶を封入した液晶パネルの両側に偏光板を貼った液晶表示体において、1枚の基板は薄くし、他方の基板は厚くし、かつ薄い方のプラスチック基板の熱膨張率が厚い方の基板の熱膨張率より大きくした液晶表示体である。

【0006】これらのプラスチックの組み合わせとしては次のような組み合わせが考えられるが、組み合わせとしては他にも色々考えることができる。

【0007】

rpmで60秒の条件でスピンコートにより塗布した。配向膜塗布後120℃、2時間乾燥した後、組立後のラビング方向がほぼ直行するようにラビング処理を行った。

30 【0011】このようにして得られた基板の一方にシール材（粒径6.3ミクロンのシリカ粒子を0.15重量パーセント含むエポキシ系接着材）をスクリーン印刷した。他方の基板の上にギャップ材（粒径6.5ミクロンのシリカ粒子）を散布した。このようにして得た2枚の基板を張り合わせ、120℃で6時間乾燥、固化させ、液晶セルとした。この液晶セルにP型液晶を注入し、セルの両面に偏光板を変更軸が直行する様に張り合わせ液晶表示体とした。

【0012】2枚の基板を張り合わせた後、パネルは薄い基板がたるむことなく、厚い基板の平坦性によって平坦性を保っていた。これに対して画面を薄い基板にした従来の場合は、必ずどちらかがそってしまった。

【0013】（実施例2）市販のガスバリアー膜付ポリエチレンテレフタレートフィルム（100ミクロン厚のPETフィルム）とポリエーテルスルホン（300ミクロン厚）の2枚のプラスチック基材を用い、実施例1と同様に液晶表示体を作成した。PETフィルムにたるみ等もなく十分満足できる液晶表示体が出来た。

【0014】

50 【発明の効果】以上述べたように本発明によれば、従来

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と同じ製造方法により、そりやたるみ等の無い作業性に優れた液晶表示体を得ることができる。又ガラス基板を用いた液晶表示体に比べ軽いという特徴を有するため携帯機器用ディスプレイとして好適であり、この液晶表示体を組み込んだ携帯機器は非常に扱い易いものとなる。

【図面の簡単な説明】

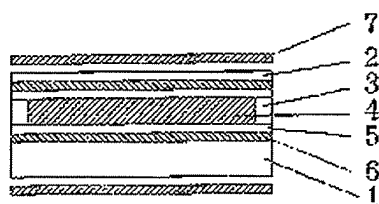
【図1】 本発明の液晶表示体の側面図を示す。

【符号の説明】

- \* 1 透明電極付き厚めのプラスチック基板
- 2 透明電極付き薄めのプラスチック基板
- 3 シール材
- 4 液晶
- 5 配向膜
- 6 電極
- 7 偏光板

\*

【図1】



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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a liquid crystal display object.

[0002]

[Description of the Prior Art] As a display object used for a portable information device, the lightweight nature and liquid crystal display object using the description of being unable to divide to a plastics base material is used.

[0003]

[Problem(s) to be Solved by the Invention] However, it was not what camber occurs in a liquid crystal panel since the expansion coefficients of length and a longitudinal direction differ, and can be satisfied with such a conventional liquid crystal display object of workability with the substrate whose rigidity of a base material is \*\*\*\*\* and two sheets made to rival. And in order to solve these faults, generating of a camber was prevented by using two substrates thick as a plastics base material. However, it was not what it can be satisfied with this approach of since thinness is sacrificed to lightness.

[0004] Then, this invention is to offer a liquid crystal display object without generating of a camber.

[0005]

[Means for Solving the Problem] In the liquid crystal display object which stuck the polarizing plate on the both sides of the liquid crystal panel with which invention according to claim 1 enclosed liquid crystal with the space where lamination, this sealant, and two substrates make the plastic plate with a transparent electrode of two sheets through a sealant, one substrate is the liquid crystal display object which made thin, and thickened the substrate of another side and the coefficient of thermal expansion of the plastic plate of the thinner one made larger than the coefficient of thermal expansion of the substrate of the thicker one.

[0006] Although the following combination can be considered as a combination of these plastics, in addition to this as a combination, it is possible many things.

[0007]

Plastics (an expansion coefficient,  $\times 10^{-5}/\text{degree C}$ ) Plastics (an expansion coefficient,  $\times 10^{-5}/\text{degree C}$ )

Polyethylene terephthalate (10) > Polyether sulphone (4.8)

Polymethylmethacrylate (8) > Polysulfone (5.5)

Polyarylate (6.2) > Polyether sulphone (4.8)

[0008]

[Embodiment of the Invention] although the sectional view of the liquid crystal display object of this invention is shown in drawing 1 R> 1 -- drawing -- setting -- 1 -- with a transparent electrode -- a thicker plastic plate -- 2 -- the plastic plate of thinning with a transparent electrode -- 3 -- a sealant -- 4 -- liquid crystal -- in 5, 6 shows an electrode and 7 shows a polarizing plate for the orientation film, respectively.

[0009] It contracts, if it returns to the room temperature after panel creation, and the inside force always works, for a \*\*\*\*\* reason, tension always commits this force outside with the substrate of the thicker one, and a thin plastic plate seems to be able to give the rigidity of the whole panel with the plastic plate of the thicker one, and for the plastic plate of the thinner one not to curtain by making small coefficient of thermal expansion of the plastic plate of the thicker one, enlarging coefficient of thermal expansion of thin plastics, and assembling a liquid crystal display object like drawing 1 .

[0010]

[Example]

(Example 1) While attached the ITO electrode to 300-micron commercial polyether sulphone, it considered as the substrate, the commercial film AT 3500 (the product made from the Fujimori industry, about 100-micron polyarylate system film, with an electrode) with the gas barrier film was chosen as a substrate of another side, and the liquid crystal cell was assembled. It is as follows when the assembly approach of a cel is described. The 2cmx5cm substrate which the strip-of-paper-like electrode attached was prepared, a detergent and pure water washed this substrate, and after drying, the orientation film (RN799, Japan Synthetic Rubber make) was applied by the spin coater on the conditions for 60 seconds on this substrate with rotational frequency 2000rpm. After orientation film spreading, after drying for 2 hours, 120 degrees C of rubbing processings were performed so that the direction of rubbing after assembly might go direct mostly.

[0011] Thus, the sealant (it is a 0.15 percentage-by-weight \*\*\*\* epoxy system binder about a silica particle with a particle size of 6.3 microns) was screen-stenciled to one side of the obtained substrate. Gap material (silica particle with a particle size of 6.5 microns) was sprinkled on the substrate of another side. Thus, two obtained substrates were dried and solidified at lamination and 120 degrees C for 6 hours, and it considered as the liquid crystal cell. P type liquid crystal was injected into this liquid crystal cell, and it considered as the lamination liquid crystal display object so that a modification shaft might go a polarizing plate to both sides of a cel direct.

[0012] After making two substrates rival, the panel was maintaining surface smoothness by the surface smoothness of a thick substrate, without a thin substrate curtaining. On the other hand, in the former which used both sides as the thin substrate, it has surely met in which.

[0013] (Example 2) Liquid crystal display object creation was carried out like the example 1 using the commercial polyethylene phthalate film with the gas barrier film (PET film of 100-micron thickness), and the plastics base material of two sheets of polyether sulphone (300-micron thickness). The liquid crystal display object sag etc. does not have in a PET film and it can be satisfied with it of the object enough was made.

[0014]

[Effect of the Invention] As stated above, according to this invention, the liquid crystal display object excellent in workability without camber, sag, etc. can be acquired by the same manufacture approach as the former.

Moreover, since it has the description that it is light compared with the liquid crystal display object using a glass substrate, it is suitable as a display for pocket devices, and it is very easy to treat the pocket device incorporating this liquid crystal display object.

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TECHNICAL FIELD

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PRIOR ART

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EFFECT OF THE INVENTION

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[Effect of the Invention] As stated above, according to this invention, the liquid crystal display object excellent in workability without camber, sag, etc. can be acquired by the same manufacture approach as the former. Moreover, since it has the description that it is light compared with the liquid crystal display object using a glass substrate, it is suitable as a display for pocket devices, and it is very easy to treat the pocket device incorporating this liquid crystal display object.

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TECHNICAL PROBLEM

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MEANS

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[Means for Solving the Problem] In the liquid crystal display object which stuck the polarizing plate on the both sides of the liquid crystal panel with which invention according to claim 1 enclosed liquid crystal with the space where lamination, this sealant, and two substrates make the plastic plate with a transparent electrode of two sheets through a sealant, one substrate is the liquid crystal display object which made thin, and thickened the substrate of another side and the coefficient of thermal expansion of the plastic plate of the thinner one made larger than the coefficient of thermal expansion of the substrate of the thicker one.

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EXAMPLE

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The side elevation of the liquid crystal display object of this invention is shown.

[Description of Notations]

- 1 Plastic Plate of Eye Thickness with Transparent Electrode
- 2 Plastic Plate of Thinning with Transparent Electrode
- 3 Sealant
- 4 Liquid Crystal
- 5 Orientation Film
- 6 Electrode
- 7 Polarizing Plate

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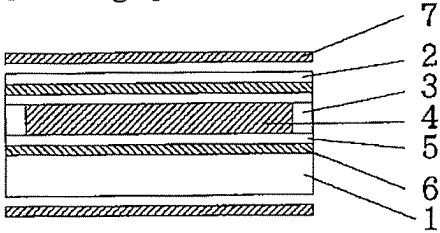
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DRAWINGS

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[Drawing 1]



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